SECTION 10

Part B

REAR AXLE AND OIL IMMERSED BRAKES

REAR AXLE AND BRAKES

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SPECIFICATION:

Crown wheel pinion ratio	...	3.4545:1
Type	...	Direct drive with 11 X 38 crown wheel pinion
Pinion preload	...	18 - 22 lbs.inch
Brake operation	...	Rods and levers.
Parking brake	...	Cable operated on both brakes indepedent of foot brake.

Special Tools:

SER / 054	...	Tractor splitting stand.
SER / 164	...	Drift
SER / 029	...	Adaptor.
SER / 028	...	Universal puller.
SER / 163	...	Bearing drive.
SER / 023	...	Differential bearing preload gauge.
SER / 024	...	Straight edge in conjuction with SER / 023.
SER / 162	...	Bearing driver.
SER / 017	...	Holder.
SER / 018	...	Bench Adaptor.
SER / 038	...	Hand press.
SER / 059	...	Adaptor.
SER / 056	...	Adaptor.
SER / 061	...	Pre - Load gauge.
SER / 022	...	Needle roller bearing puller.
SER / 063	...	Needle roller bearing driver.
SER / 058	...	Universal Handle.
SER / 060	...	Pinion lock nut ‘C’ Spanner.
SER / 064	...	Preload checking gauge aid.
SER / 117	...	Extractor.
SER / 030	...	Bearing remover main tool.
SER / 225	...	Axle housing cup remover.
SER / 118	...	Preload checking tool.
SER / G / 204	...	To press cup on differential carrier left - hand.
SER / G / 207	...	To press cone on differential lock.
SER / G / 228	...	Plate differential carrier cone removal.
SER / G / 227	...	Differential case left - hand cup removal.
SER / G / 223	...	To press bush into the carrier

SER / G / 224	...	Carrier bush pusher
SER / G / 194	...	Adaptor.
SER / G / 195	...	Adaptor
SER / G / 196	...	Bearing cup and seal remover.
SER / G / 198	...	Bearing cup assembler.
SER / G / 197	...	Seal replacer.
SER / G / 199	...	Bearing cone remover.
SER / G / 200	...	Bearing cone remover.
SER / G / 201	...	Bearing replacer.

Bolt torques:

Rear Wheels nuts	...	200 lbf.ft (270 Nm)
Epicyclic unit housing bolts	...	55 lbf.ft (75 Nm)
Stabliser mounting bolts	...	170 lbf.ft (230 Nm).
Differential case mounting bolts	...	80 lbf.ft (108 Nm)
Centre mounting bolts	...	18 lbf.ft (25 Nm)
Sleeve mounting bolts	...	118 lbf.ft (160 Nm)

10B . 1 GENERAL

The drive from the Transmission mainshaft is transmitted through the rear drive shaft and shear tube to a spiral bevel driving pinion and crown wheel, then through the axle shafts to the rear wheel axles.

The driving pinion is supported in the centre housing by a straight roller pilot bearing and a pre-loaded housing assembly carrying two taper roller bearings.

The Crownwheel is attached to the split differential case, which is supported on each side by a tapper roller bearing. The differential pinions run on a cross joint and thrust is taken by thrust washers behind the pinions.

The axle shaft inner ends are splined into differential gears, and the outer ends are mounted in rear wheel disc.

This tractor is fitted with multi-disc oil cooled brakes between the axle housings and the differential carrier plates adjacent to the centre housing.

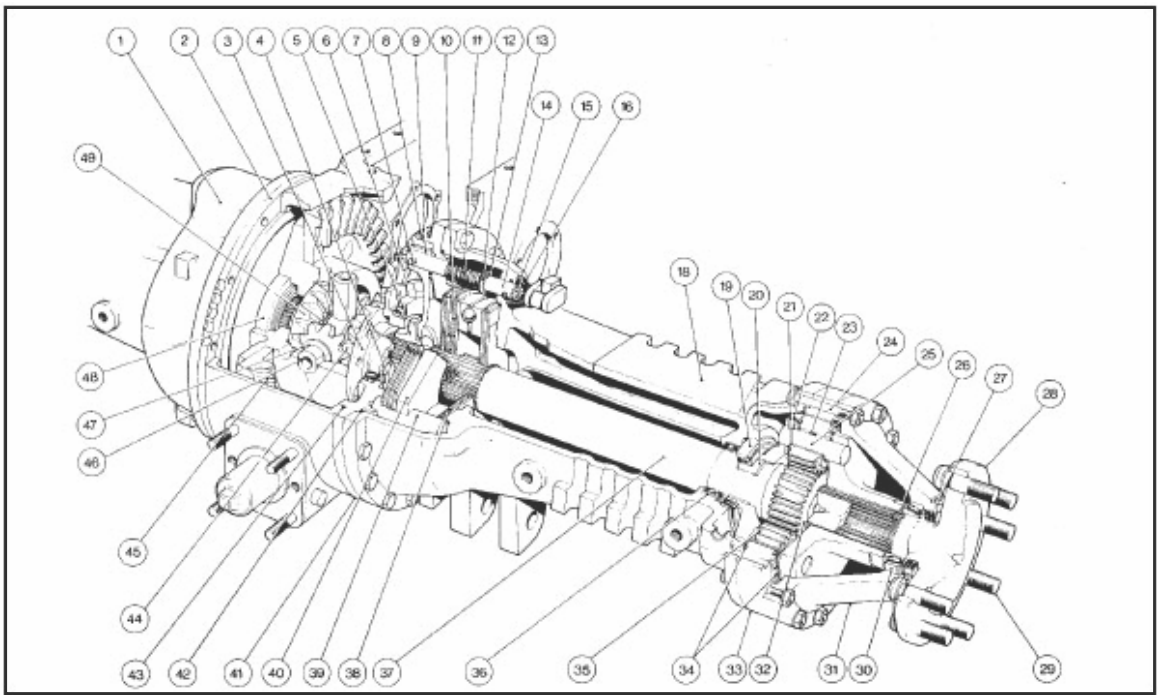
The brakes are operated by two independently operated pedals located on the right of the transmission housing.

The right pedal operates the right hand brake and the left pedal operates the left hand brake, to assist turning.

For off-field use, the brakes are used together by operating an interlocking latch which joins the two brake pedals.

When only single brakes are applied on the tractor the parking brake also actuates these disc brakes.

Pressure on the brake pedal brings an actuating assembly in contact with two rotating middle (friction) discs splined to each axle shaft, these in turn contact fixed friction faces provided in the axle housing and in the differential carrier plate fitted between the centre and axle housings. The mechanism of each brake consists of two cast iron actuating disc, held together by tension springs and separated by steel balls located in inclined seats. Pressure on the brake pedal, pulling on the operating rod, rotates one actuating disc relative to the other, and the steel balls ride up their inclined seats and so spread the actuating disc apart. These come into contact with the rotating (friction disc), which are splined to the shaft being braked. The actuating assembly will move slightly in the direction of rotation until the torque ear of the one actuating disc comes into contact with a shaft in the housing. The other actuating disc tends to rotate further, increasing the angular displacement between the discs, and assisting the braking action. When the operating pull is released, the tension springs cause the discs to return to their normal position.



Key to Figure – 1

1	Axle Housing- Left-hand	18	Axle Housing – Right-hand	34	Gasket
2	Carrier Plate - Left-hand	19	Epicyclic Hub-Inner bearing	35	Planet Gear
3	Differential lock Coupler cap	20	Epicyclic hub – bush	36	Inner Oil seal
4	Differential lock Coupler	21	Thrust Washer	37	Axle shaft
5	RH Differential bearing	22	Roll pin	38	Brake friction plate
6	Pinion Assembly	23	Needle rollers	39	Brake stop rod
7	Roll pin	24	Epicyclic unit securing bolts	40	Actuator unit
8	Ground Speed gear	25	Planet gear-shaft	41	Carrier plate-Right-hand
9	Differential lock coupler fork	26	Half ring	42	'O' ring- Outer
10	Brake interplate	27	Outer oil seal	43	'O' ring- Inner
11	Differential lock return spring	28	Stub axle	44	Differential gear-RH
12	Washer	29	Wheel stud	45	Crown wheel
13	Circlip	30	Outer Bearing	46	Cross shaft
14	Differential lock actuating shaft	31	Cover Rear Drive	47	Thrust washer
15	Differential lock adjusting nut	32	Sun gear	48	Differential Bearing
16	Dust cover	33	Ring Gear	49	Differential Gear-Left-hand

10B . 2 REAR WHEEL STUD

Removal and Replacement

Removal

1. Jack up the tractor.
2. Remove the rear wheel
3. Drive out the damaged stud.

   Examine the stud hole, the other studs and the wheel disc for signs of fretting or damage.

Refitment:

4. Locate a new stud in the wheel axle.
5. Tap the stud gently to locate the splines.
6. Fit a new wheel nut, with the flat side against the axle to the stud and pull the stud through the axle to its correct position.
7. Remove the nut.
8. Refit the rear wheel and nuts and tighten the nuts progressively and evenly to a torque of 200 lbf.ft (270 Nm).

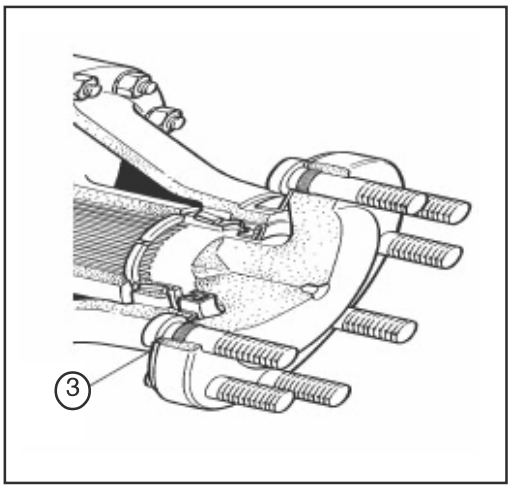


Fig 2

10B.3 EPICYCLIC UNIT OUTER HOUSING AND RING GEAR

Removal and Refitment

Removal

1. Apply the parking brake.
2. Jack up the tractor.
3. Remove the rear wheel.
4. Scribe a mark across the outer housing, ring gear, and axle housing to facilitate refitment. Also scribe a mark across the outer housing and ring gear only, this will ensure that the ring gear is replaced with the teeth in full engagement.
5. Remove the nuts and bolts.
6. Remove the outer housing and ring gear assembly.
7. Remove the ring gear.

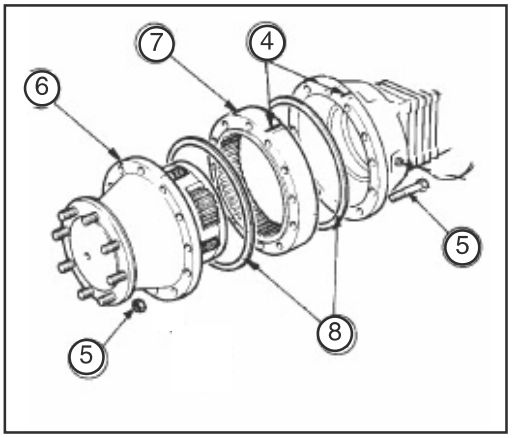


Fig 3

Note: *Do not withdraw the axle shaft.*

8. Remove and discard the two cork gaskets. Clean the recesses in which the ring gear spigots are located and check that there is no burr or deformity which could cause leakage.

Refitment

10. Reverse procedure 1 to 8 except:

    a. Fit new cork gaskets.

    b. Ensure that the scribe marks are correctly aligned ensuring that the teeth of the ring gear are in full engagement, otherwise severe damage can occur.

    c. Tighten the nuts and bolts to a torque of 55 lbf ft (75 Nm).

    d. Refill to the correct level with an approved oil.

10B.4 EPICYCLIC PLANET AND SUN GEAR

Servicing

Special Tools : 3/8 inch UNF bolt

Disassembly

1. Remove the outer housing assembly. (See operation 10B.3) To service the sun gear it is only necessary to remove one planet gear.

   Note : *The sun gear will come out through only one of the planet gear operation. It is wider than the other two.*

2. Drive out and discard the roll pin.

3. Fit the 3/8 inch bolt to the planet gear shaft.

4. Withdraw the shaft trying not to dislodge the needle rollers.

5. Remove the 3/8 inch bolt.

6. Remove the thrust washers and the planet gear. Repeat operations 2 to 6 only if the epicyclic hub is to be completely overhauled.

7. Withdraw the sun gear. Inspect all parts and replace any which show signs of undue wear or damage.

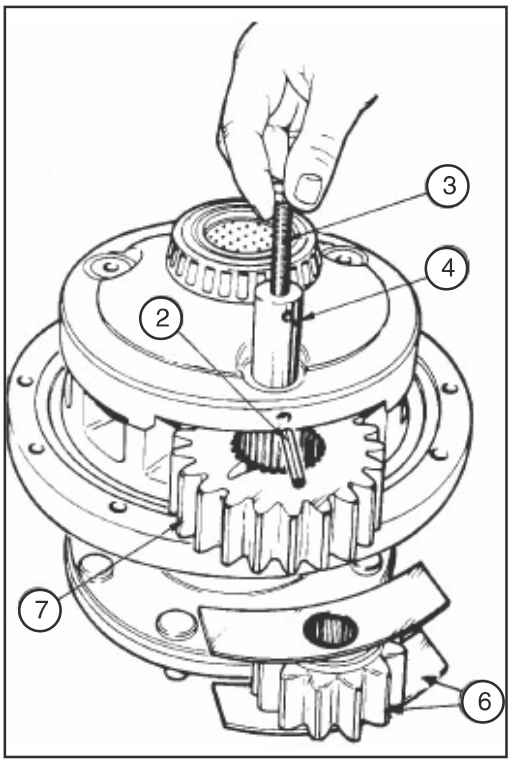


Fig 4

Reassembly

8. Reverse procedure 1 to 7 except:

   a) If the needle rollers are dislodged, refit them using petroleum jelly, not grease. There are 58 needle rollers per planetary gear (two rows of 29, plus a spacer washer).

b) Ensure that the holes in the casting and shaft are aligned.

c) Fit a new roll pin.

d) The wider opening for the removal of the sun gear has special wide thrust washer. Ensure that they are fitted to the correct planetary gear.

   Note : *Planetary gears must be fitted with the larger shoulder facing the centre at the axle.*

10B.5 EPICYCLIC UNIT

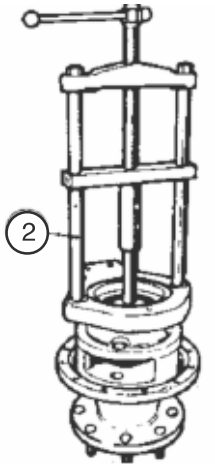
Servicing

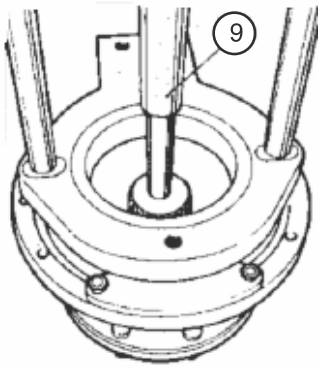
Special tools :

a. SER/028 - Differential bearing remover.
b. SER/029 - Base
c. SER/038 - Hand press
d. SER/G/223 - To press bush into carrier
e. SER/G/224 - Carrier bush pusher
f. SER/G/194 - Adaptor
g. SER/G/195 - Adaptor
h. SER/G/196 - Bearing cup and seal remover.
i. SER/117 - Extractor
j. SER/G/198 - Bearing cup assembler
k. SER/030 - Bearing remover (Main tool)
l. SER/225 - Axle Housing cup remover.
m. SER/058 - Drive Handle
n. SER/G/197 - Seal replacer
o. SER/G/199 - Bearing cone replacer
p. SER/G/200 - Bearing cone replacer
q. SER/G/201 - Bearing replacer

Disassembly

1. Remove the planetary gear and sun gear. (See operation 10B.4)
2. Remove the bearing cone using SER/029 and SER/G/194.
3. Normal Duty Axles: Tap the bearing bush into the hub using SER/G/223
4. Normal Duty Axles: Remove the bush and SER/G/224 from the hub.
5. Place the dismounted wheel on the workshop floor.
6. Fit the outer housing and hub assembly and secure with two wheel nuts.
7. Fit SER/117 and remove the hub from the housing.
8. Remove the two half rings.
9. Using SER/038 and SER/G/195 press out the wheel axle.
10. Lift out the bearing cone.





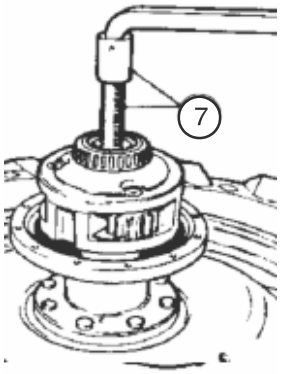


Fig 5

11. Tap out the outer seal. Using special tool SER/G/196.

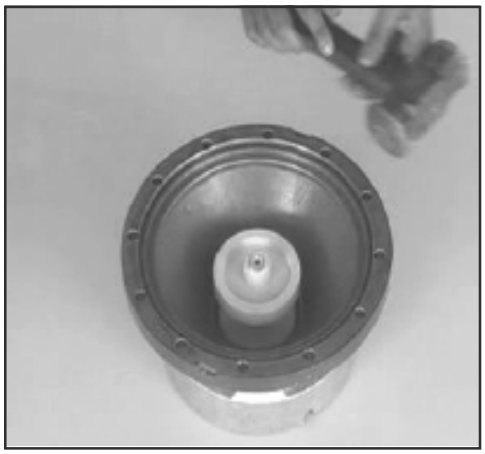


Fig 6

12. Tap out the bearing cup. Using special tool SER/G/196.

Fig 7

13. Fully apply the parking brake and check that the transmission oil is no higher than the FULL mark on the dipstick. Remove the axle shaft.
14. Using SER/G/225, remove the inner bearing cup and shims.
15. Inspect all parts and replace any which show signs of undue wear or damage. Replace all seals and gaskets.

Reassembly

16. Using SER/G/198 Refit the bearing cup, making sure it is fully seated.

Fig 8

17. Smear a new outer seal lightly with recommended "Loctite 243", then drive it into the housing using SER/G/197 metal face outwards, and 0.080 inch (2 mm) above the housing (dimension A). Smear the lip, and fill the seal cavity with petroleum jelly.

Note :

Allow the Cone assembly undisturbed for 72 hours for the seal to get firmly located in its position.

18. Carefully, insert the wheel axle through the outer seal.

19. Using SER/G/199 drive the bearing cone fully onto the wheel axle, seating the rollers in the cup.

Fig 9

Fig 10

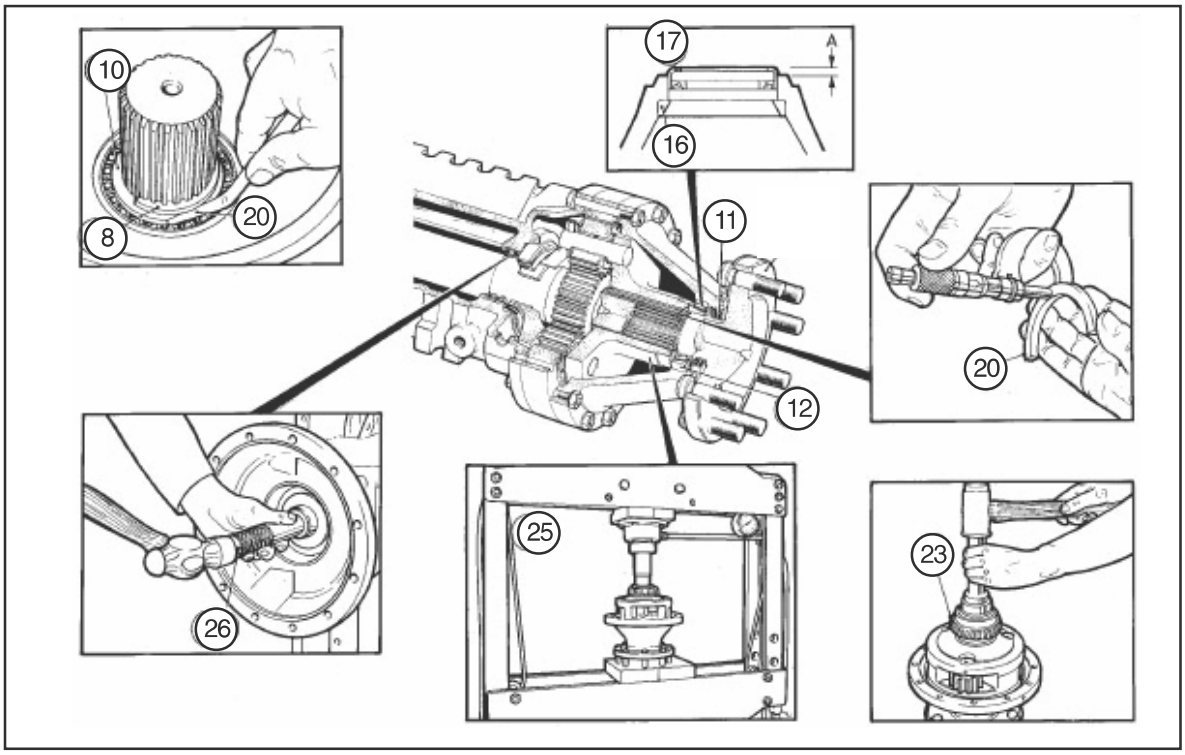


Fig 11

NORMAL AXLES

Using the number 0 half ring and feeler gauges measure the gap between the bearing cone and the half ring. If there is no clearance, the No. 0 half ring can be used. If the clearance is measurable, select a pair of half rings to give a clearance of 0.00 to 0.001 inch (0.00 to 0.025 mm) by using the following procedure and the table below.

Half ring	Feeler gap	Half ring thickness		Part No.	Identification No.
mm	inch	mm	inch		
5.92	0.233	5.84	0.230	882601M1	0
5.94	0.234	5.89	0.232		
5.95	0.2341	5.90	0.2321	882602M1	1
5.99	0.236	5.94	0.234		
6.00	0.2361	5.95	0.2341	882603M1	2
6.04	0.238	5.99	0.236		
6.05	0.2381	6.00	0.2361	882604M1	3
6.09	0.240	6.04	0.238		

a. Using a micrometer, measure the thickness of the No. 0 half ring.

b. Add the No. 0 half ring thickness to the feeler gauge measurement to give the thickness of the half rings required.

21. Fit the two half rings, ensuring that they seat fully in the groove.

Fig 12

22. Using the SER/058 Drive handle, SER/G/200, drive the bearing cone onto the spigot on the epicylic hub.
23. Reassemble the planetary gears and the sun gear in the epicyclic hub.
24. Using the handle, SER/G/200 and a hydraulic press, drive the epicylic hub onto the wheel axle.
25. Check the epicyclic preload.
26. Refit the inner bearing cup and shim in the axle housing, using special tool SER/G/201.
28. Refit the ring gear and outer housing assembly. (operation 10B.3)

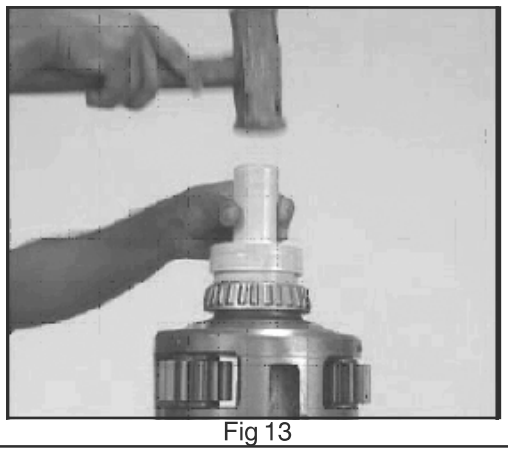


Fig 13

10B.6 EPICYCLIC PRE-LOAD

Special Tools :

SER/118 – Preload Checking tool

SER/028 – Puller

SER/029 – Base

SER/G/194 – Adapter

Procedure

1. Remove the outer housing and ring gear.
2. Remove the two cork gaskets and thoroughly clean the mating faces of the ring gear and outer housing.
3. Bolt the ring gear to the outer housing using four bolts from the epicyclic unit with four wheel nuts as spacers. These bolts should be equally spaced around the ring gear.

Note: Ensure that the ring gear is correctly fitted i.e., with the teeth in full engagement.

4. Ensure that the oil level is not higher than the FULL mark on the dipstick, fully apply the handbrake and remove the half-shaft.
5. **Normal / Axle**
   Using SER/028, SER/029 & SER/G/194 remove the inner bearing cup from the trumpet housing.
6. Remove the old shims.
7. Place the bearing cup on the spigot in the centre of SER/118. Do not fit the shims.
8. Place the epicyclic unit on SER/118 and measure the gap at points 'A' using two feeler gauges.
9. Note the clearance, which must be equal at both sides, then select shim or shims as per sizes from the table provided.

11.7 REAR AXLE EPICYCLIC PRE-LOAD TABLE

Gap Measured by Feeler Gauges (Both Sides)				Shim thickness required	
mm		inches		mm	inches
0.02	0.11	0.001	0.004	1.14	0.045
0.12	0.24	0.005	0.009	1.02	0.040
0.25	0.36	0.010	0.014	0.89	0.035
0.37	0.49	0.015	0.019	0.76	0.030
0.50	0.62	0.020	0.024	0.64	0.025
0.63	0.74	0.025	0.029	0.51	0.020
0.75	0.87	0.030	0.034	0.38	0.015
0.88	1.00	0.035	0.039	0.25	0.010
1.01	1.13	0.040	0.044	0.13	0.005
1.14	1.25	0.045	0.049	0.000	0.000

The shims are available as follows :

Shim Thickness		Part No.
mm	inches	
0.13	0.005	894757M1
0.25	0.010	894758M1
0.38	0.015	894759M1

10. Fit the shims to the axle housing.
11. Refit the inner bearing cup, ensuring that it is fully seated.
12. Refit the axle shaft.
13. Remove the four bolts and spacers securing the ring gear to the outer housing.
14. Using new cork gasket, refit the ring gear and outer housing. (operation 10B.3)

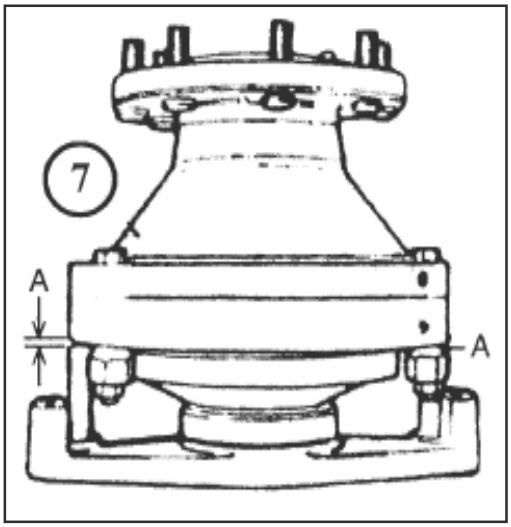


Fig 14

10B.7 AXLE HOUSING LEFT HAND

Removal and Refitment

Special tools : SER / 054 Tractor splitting stand.

Removal

1. Drain the transmission oil.
2. Release the lift rod at the knuckle.
3. Release the check chain at the check chain anchor bracket.
4. Release the stabilizer bracket underneath the axle housing.
5. Release the forward end of the lower link from the axle housing bracket.
6. Remove the lift arm and lower link assembly complete.
7. Release the brake pull rods and the return spring.
8. Jack up the tractor under the axle housing being serviced.
9. Remove the left hand rear wheel.
10. Place the SER / 054 tractor splitting stand under the centre housing and lower the tractor until the jack is just taking the axle housing weight.
11. Remove all the nuts and bolts securing the axle housing to the centre housing.
12. Lower the axle housing slightly and withdraw it far enough to clear the half shaft from the differential splines.
13. Withdraw the axle housing completely.
14. Remove the 'O' ring from the flange on the carrier plate.

Refitment

15. Reverse procedures 1 to 14 except:
    a. Fit a new 'O' ring, using petroleum jelly.
    b. When manoeuvering the axle housing assembly back into position, take care to align the axle shaft splines in the differential unit

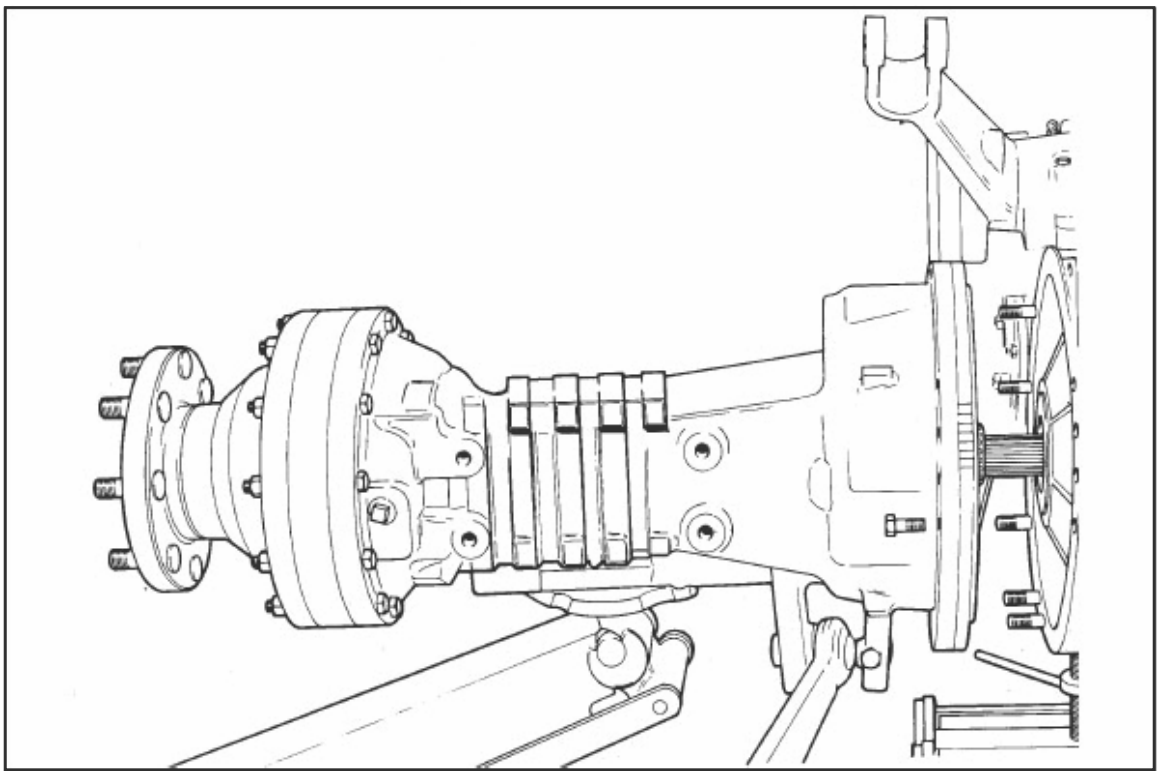


Fig 15

and the studs through their holes in the centre housing.

c. Apply a few drops of stud lock, then fit and tighten the stabilizer mounting bolts to a torque of 170 lbf ft (230 Nm).

d. Brush the wheel stud threads clean.

e. Refit the rear wheel and lightly oil the stud threads before fitting the wheel nuts.

Tractors fitted with 11/16 inch (17.5 mm) diameter studs.

Tighten the nuts progressively and evenly to a torque of 240 lbf ft (325 Nm).

Note : *The full quantity of oil, as stated in the specification will not be required as approximately 0.66 gal (2.5 liter) will be trapped by the carrier plates in the axle housing.*

16. Adjust and balance the brakes.

10B.8 AXLE HOUSING RIGHT HAND

Removal and Refitment

Special tools : SER / 054 Tractor splitting stand

1. Drain the transmission oil.
2. Release the leveling box at the knuckle.
3. Release the check chain at the check chain anchor bracket.
4. Release the stabilizer bracket underneath the axle housing.
5. Release the forward end of the lower link from the axle housing bracket.
6. Remove the lift arm and lower link assembly complete.
7. Release the brake pull rods and the return spring.
8. Jack up the tractor under the axle housing being serviced.
9. Remove the right hand rear wheel.
10. Place the SER / 054 Tractor splitting stand kit under the centre housing and lower the tractor until the jack is just taking the axle housing weight.
11. Remove all the nuts and bolts securing the axle housing to the centre housing.
12. Lower the trumpet housing slightly and withdraw it far enough to clear the half shaft from the differential splines.
13. Withdraw the axle housing completely.
14. Remove the 'O' ring from the flange on the carrier plate.

Refitment

15. Reverse procedures 1 to 14 except:
    a. Fit a new 'O' ring using petroleum jelly.
    b. Carefully manoeuvre the axle housing into position, taking care to align the axle shaft splines in the differential unit and the studs through their holes in the centre housing.
    c. Apply a few drops of Loctite stud lock, then fit and tighten the cab stabilizer mounting bolts to a torque of 170 lbf ft (230 Nm).
    d. Brush the wheel stud threads clean.
    e. Refit the rear wheel and lightly oil the stud threads before fitting the wheel nuts.

Tractors fitted with 11/16 inches (17.5 mm) diameter studs. Tighten the nuts progressively and evenly to a torque of 325 Nm (240 lbf ft).

Note: *The full quantity of oil, as stated in the specification will not be required as approximately 0.66 gal (2.5 liter) will be trapped by carrier plate in the axle housing.*

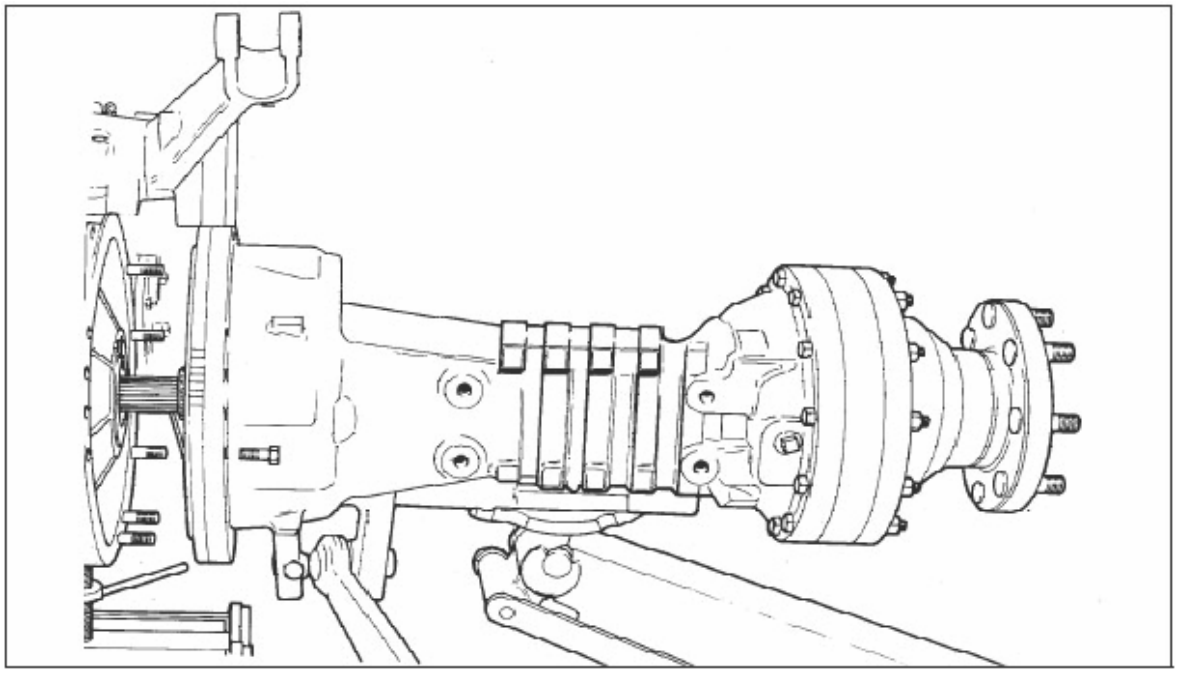


Fig 16

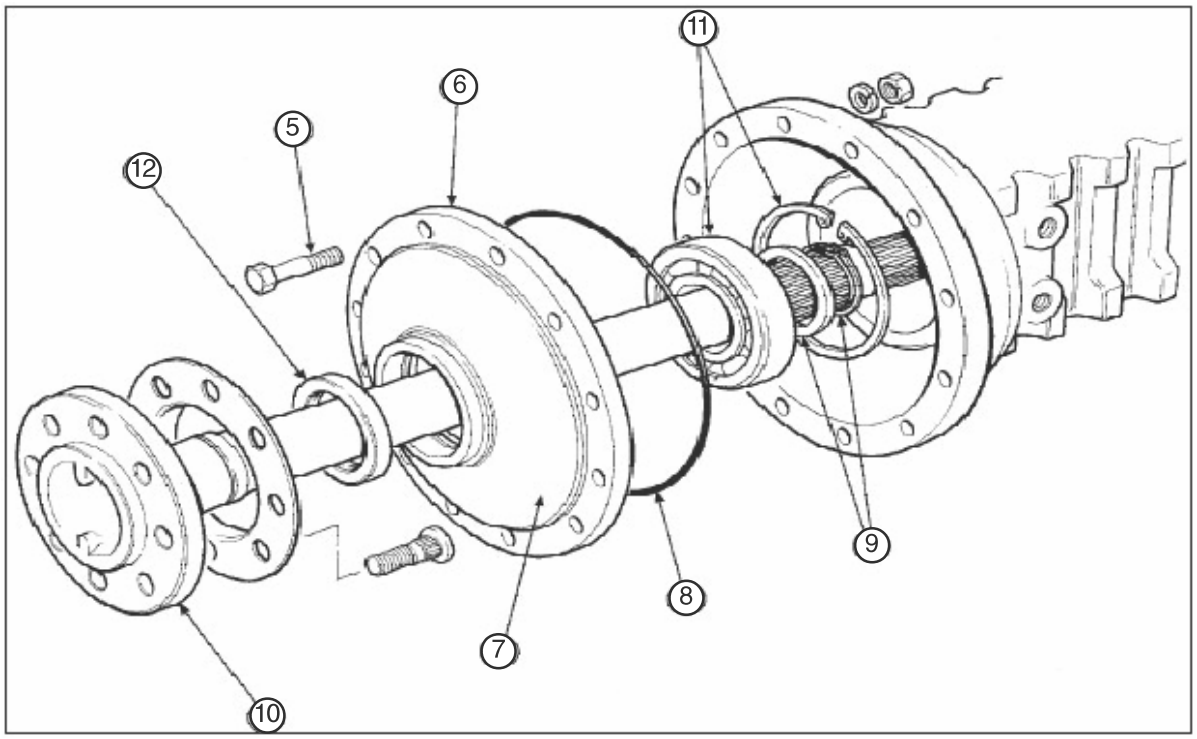


Fig 17

10B . 9 AXLE SHAFT – DIRECT DRIVE - WET BRAKES

Removal and refitment

Note: *This Axle shaft which has a taper roller bearing retained by a shrink fit collar. It can be identified by the large ball bearing retained by a spacer and circlips.*

Removal:

1. Jack up the tractor under the axle housing to be serviced.
2. Drain the oil from the transmission.
3. Remove the rear wheel.
4. Ensure that the parking brake is hard on.
5. Remove the 12 nuts, bolts and spring washer.
6. Pry apart the axle housing between the end cover and axle housing.
7. Remove the axle and end cover assembly.
8. Remove the 'O' ring and discard.
9. Remove the external circlip and spacer.
10. Drive the axle shaft out of the bearing and cover assembly.
11. Remove the internal circlip and ball bearing if necessary.
12. Remove and discard the oil seal.

Refitment:

13. Coat the oil seal with MF lock and seal (Loctite 542) and press into the cover up to the shoulder.
14. Replace the ball bearing if necessary.
15. Refit the axle shaft, spacer and circlip.
16. Replace the 'O' ring.
17. Place the axle shaft into the axle housing. Carefully passing the shaft through the brake plates.
18. Refit the nuts and bolts tightening to a torque of 54 lbf.ft (74 Nm).
19. Refit the rear wheel and nuts, and then tighten the nuts progressively and evenly to a torque of 199 lbf.ft (270 Nm).
20. Refill the transmission with approved oil to the correct level.
21. Adjust the brakes.

10B.10 LEFT HAND. CARRIER PLATE

Removal and Refitment

Special tools : SER / 054 Tractor splitting stand.

Removal

1. Remove the axle housing(see operation 10B.7)
2. Manoeuvre the axle housing, off the jack and stand it on end.
3. Remove the two countersunk screws.
4. Withdraw the carrier plate from the axle housing.
5. Remove and discard the inner 'O' ring.

Refitment

6. Reverse procedures 1 to 5 except:

   a. Place a new 'O' ring in the recess in the axle housing using a smear of petroleum jelly for location. Do not attempt to fit the 'O' ring to the carrier plate.

   b. Secure each countersunk screw with a centre punch mark.

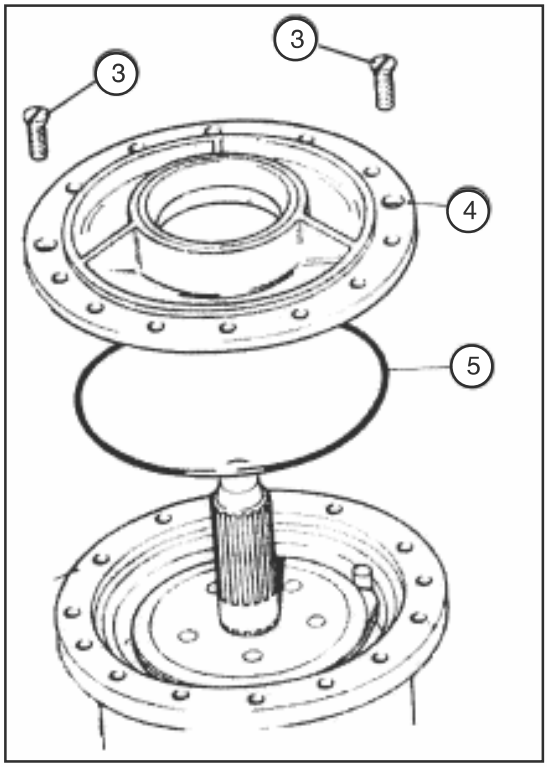


Fig 18

10B.11 RIGHT HAND CARRIER PLATE

Removal and Refitment

Special Tools: SER / 054 Tractor splitting stand.

Removal

1. Remove the axle housing(see operation 10B.8)
2. Manoeuvre the axle housing, off the jack and stand it on end.
3. Remove, and discard the roll pin.
4. Remove the two countersunk screws.
5. Remove the carrier plate complete with the differential lock coupler fork and coupler.
6. Remove and discard the inner 'O' ring.
7. Remove the differential lock coupler fork and coupler.

Refitment

8. Reverse procedures 1 to 7 except:

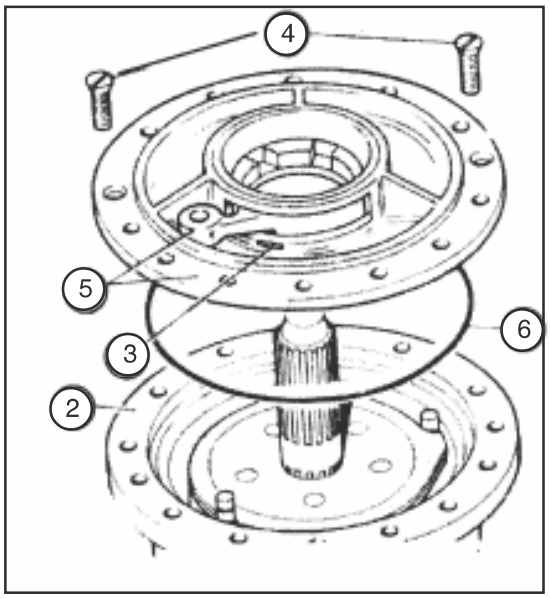


Fig 19

a. Fit a new 'O' ring to the recess in the axle housing using petroleum jelly. Do not attempt of fit the 'O' ring to the carrier plate.

b. Assemble the differential lock coupler fork and coupler to the carrier plate, then refit the assembly, aligning the coupler splines on the axle shaft and the coupler fork on its shaft. (if fitted)

c. Secure each countersunk screw with a centre punch mark.

d. Fit a new roll pin.

10B.12 LEFTHAND. BRAKE ACTUATOR HOUSING

(MECHANICAL BRAKES)

Servicing Tools : SER/164 - Drift

Disassembly

1. Drain the transmission oil to the MIN mark on the dipstick.
2. Disconnect the brake pull rods.
3. Remove the brake return spring.
4. Remove the locknut, nut and spacer.
5. Remove the three bolts and spring washers.
6. Remove the housing.
7. Remove and discard the gasket.
8. Tap out and, if damaged , discard the rubber boot.
9. If necessary, remove the brake pull lever by removing the split pin(9) and pushing out the pivot shaft (10).

Examination

Examine the mating faces of the actuator housing and the axle housing for damage. Clean both surfaces before reassembly.

Reassembly

10. Reverse procedures 1 to 8 except:
    a. If necessary fit a new rubber boot, preferable using a SER/164.
    b. Fit a new gasket.
    c. Before refitting the housing, smear the brake actuator rod with petroleum jelly. When refitting the housing take care to seat the lips of the rubber boot in the step on the actuator rod, without disturbing the garter spring.

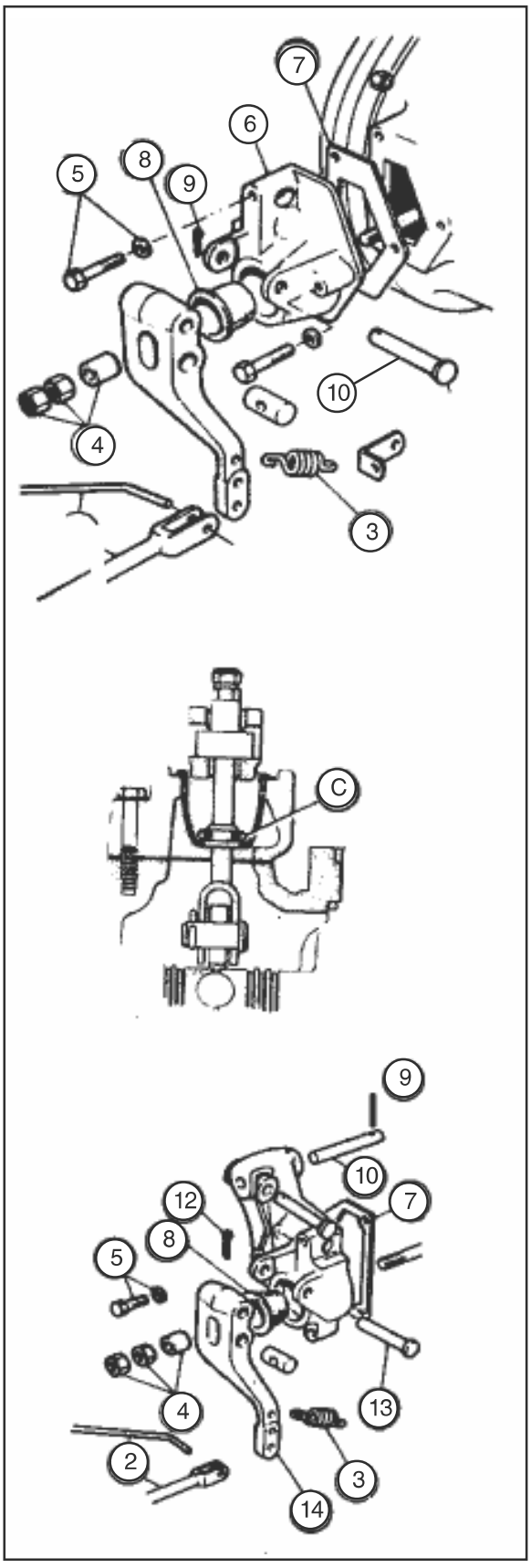


Fig 20

d. The three bolts are of varying lengths according to their position in the actuator housing.

11. Adjust and balance the brakes.

10B.13 RIGHTHAND. BRAKE ACTUATOR HOUSING AND DIFFERENTIAL LOCK MECHANISM

(MECHANICAL BRAKES)

Servicing Tools : SER/164 - Drift

Disassembly

1. Drain the transmission oil to the MIN mark on the dipstick.
2. Disconnect the brake pull rods.
3. Remove the brake return spring.
4. Remove the locknut, nut and spacer.
5. Remove the three bolts and spring washers.
6. Remove the actuator housing complete.
7. Remove and discard the gasket.
8. Tap out and , if damaged , discard the rubber boot.

Note: *Do not remove the differential lock lever mechanism or the brake pull lever unless they are to be serviced. (if fitted)*

Only If necessary continue as follows:

9. Tap out and discard the groove pin.
10. Remove the pivot pin.
11. Remove the lever assembly.
12. Remove and discard the split pin.
13. Push out the pivot shaft.
14. Remove the brake pull lever.
15. Examine the joint faces of the actuator housing and the trumpet housing for damage, clean both surfaces thoroughly before reassembly.

Reassembly

16. Reverse procedures 1 to 8 or 1 to 15 depending on the extent of disassembly except:
    a. If necessary, fit a new rubber boot, preferably using a SER/164.
    b. Fit a new gasket.

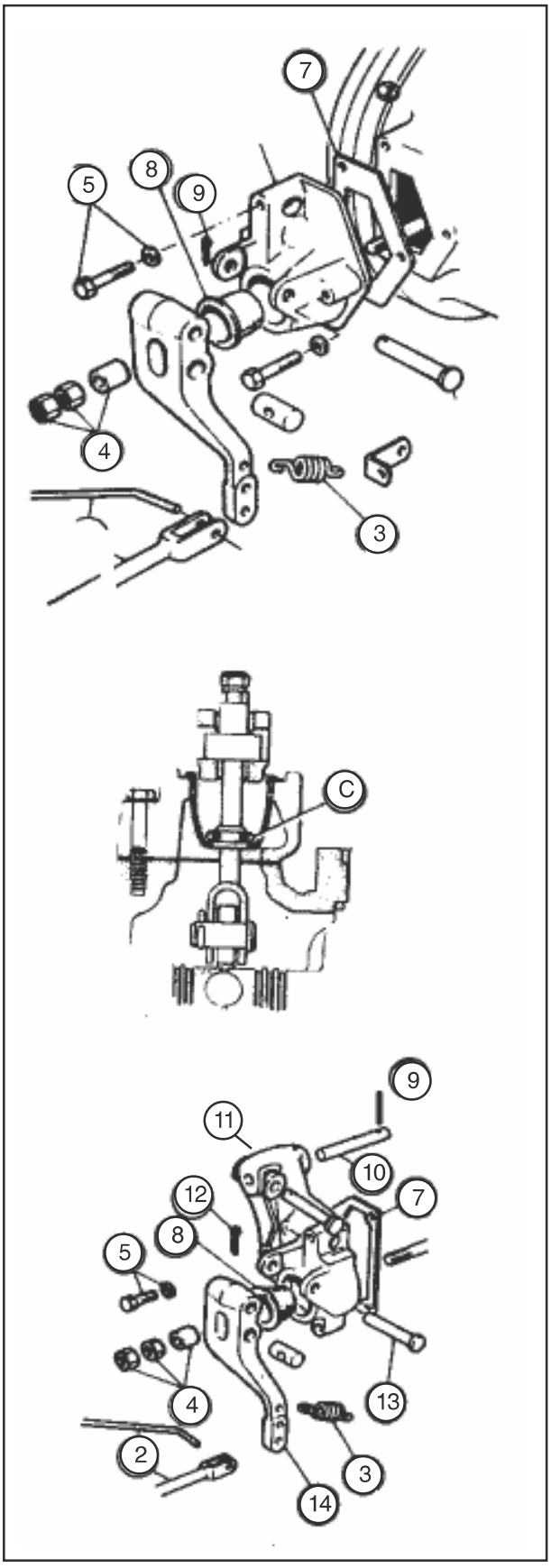


Fig 21

c. Before refitting the actuator housing, smear the brake actuator rod with petroleum jelly. When refitting the housing take care to seat the lips of the rubber boot in the step on the actuator rod, without disturbing the garter spring.

d. The three bolts are of varying lengths according to their position in the actuator housing.

17. Adjust and balance the brakes.

10B.14 BRAKE ADJUSTMENT AND BALANCING

Mechanical Actuation

Procedure is as follows:-

Brakes

Check the brakes every 250 hours, or more frequently if heavy work is involved.

Procedure to adjust the brakes:

a) Jack up the tractor until both rear wheels are clear of the ground.

b) Unlatch brake pedals.

Initial brake adjustment:

c) With the aid of an assistance, rotate one of the wheels forward slowly, at the same time tighten the adjuster nut (1) until the wheel just locks. The brake expander clearance is adjusted by unscrewing the adjuster nut (1) a number of flats based upon the number of friction disc.

MF 2615 = 9 flats (1-1/2 turns)

d) Repeat procedure for opposite side.

e) Road test the tractor, and check the brakes for binding or pulling to one side. Any tendency to pull to one side should be counteracted by slackening off the adjuster nut (1) on the side to which the tractor pulls.

CAUTION:

If, after the full adjustment procedure, brake operation is unsatisfactory, notify your Massey Ferguson Dealer immediately for investigation and rectification.

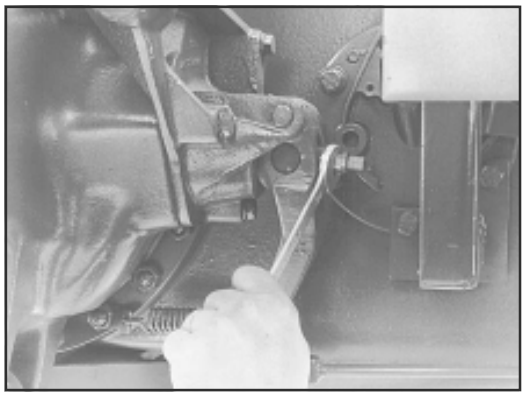


Fig 22

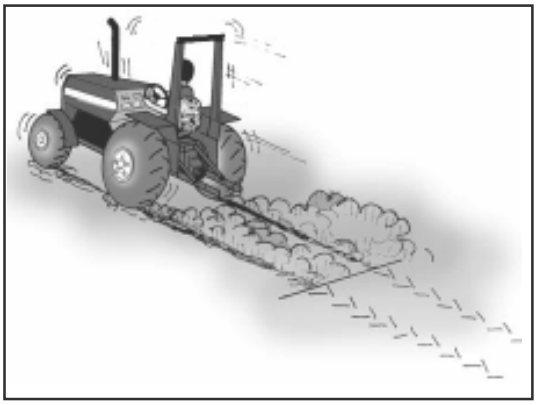


Fig 23

10B.15 LEFT HAND BRAKE

Servicing

Special Tools: SER / 054 Tractor splitting stand
SER/164 - Drift

Disassembly

1. Remove the left-hand axle housing. (see operation 10B.7)
2. Manoeuvre the axle housing assembly off the jack and stand it on end.
3. Remove the locknut, nut and spacer.
4. Remove the three bolts and spring washers.
5. Withdraw the actuator housing
6. Tap out and discard the rubber boot.
7. Remove the carrier plate. (see operation 10B.9)
8. Remove the brake components, turning each plate over and stacking in reverse order to ensure correct refitment.
9. If necessary, remove the brake stop rod from the housing.

Only if necessary dismantle the actuator unit as follows:

10. Release the four springs.
11. Remove the actuator rod and links and the ball bearings.

Examination

Friction plates : These have a minimum groove depth of 0.12 inch (0.3 mm) when new. When worn to the extent that the groove begin to disappear , the plates must be replaced.

Interplates : The interplates can generally be refitted, but should be replaced either when badly scored or worn more than 0.005 inch (0.13 mm) per face. The interplates should also be replaced when the friction plates are renewed.

Check all plates for signs of severe overheating or distortion.

Note: *Never attempt to reclaim friction plates or interplate by lapping or grinding.*

Actuator Plates: The actuator plates do not normally need replacing, but should be checked for severe scoring.

Thoroughly clean out the brake housing and remove any burrs or pieces of old gasket from the actuator and axle housings.

Reassembly

12. Reverse procedures 1 to 8 or 1 to 11 depending on the extent of disassembly, except:

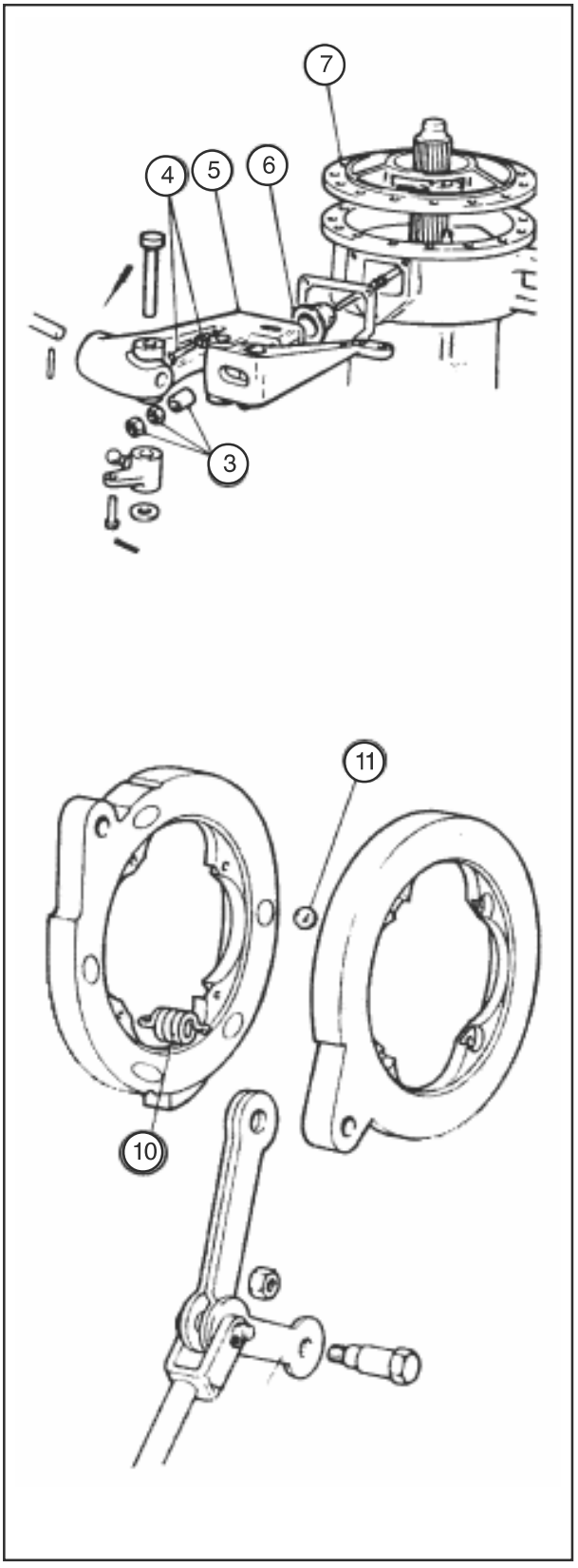


Fig 24

a. **Dip each friction plate, interplate and the actuator unit in clean transmission oil before refitting them into the housing. THIS IS MOST IMPORTANT. Refit all plates in the order in which they were originally assembled.**
b. Refit the carrier plate.
c. Fit a new rubber boot, preferably using Special Tool No. SER/164.
d. Smear the actuator rod with petroleum jelly, then refit the actuator housing ensuring that the lip of the rubber boot seats correctly in the ridge on the actuator rod. Do not displace the garter spring.
e. The three bolts are of varying lengths according to their location in the actuator housing.

13. Adjust and balance the brakes.

10B.16 RIGHT HAND BRAKE

Servicing

Special Tools: SER / 054 Tractor splitting stand

Disassembly

1. Remove the right-hand axle housing. (see operation 10B.8)
2. Manoeuvre the axle housing assembly off the jack and stand it on end.
3. Remove the brake adjusting locknut, nut and spacer.
4. Remove the three bolts and spring washers.
5. Remove the actuator housing complete with the differential lock lever mechanism.
6. Tap out and discard the rubber boot.
7. Remove the carrier plate.
8. Remove the brake components, turning each plate over and stacking in reverse order to ensure correct refitment.
9. If necessary, remove the brake stop rod from the housing.

   Only if necessary dismantle the actuator unit as follows:
10. Release the four springs.
11. Remove the actuator rod and links and the ball bearings.

Examination

Friction Plates : These have a minimum grooves depth of 0.12 inch (0.3 mm) when new. When worn to the extent that the grooves begin to disappear, the plates must be replaced.

Interplates : The interplates can generally be refitted, but should be replaced either when badly scored or worn more than 0.005 inch (0.13 mm) per face. The interplates should also be replaced when the friction plates are renewed.

Check all plates for signs of severe overheating or distortion.

Note: *Never attempt to reclaim friction plates or interplates by lapping or grinding.*

Actuator Plates: The actuator plates do not normally need replacement, but should be checked for severe scoring.

Thoroughly clean out the brake housing and remove any burrs or pieces of old gasket from the actuator and trumpet housing.

12. Reverse the procedure for reassembly

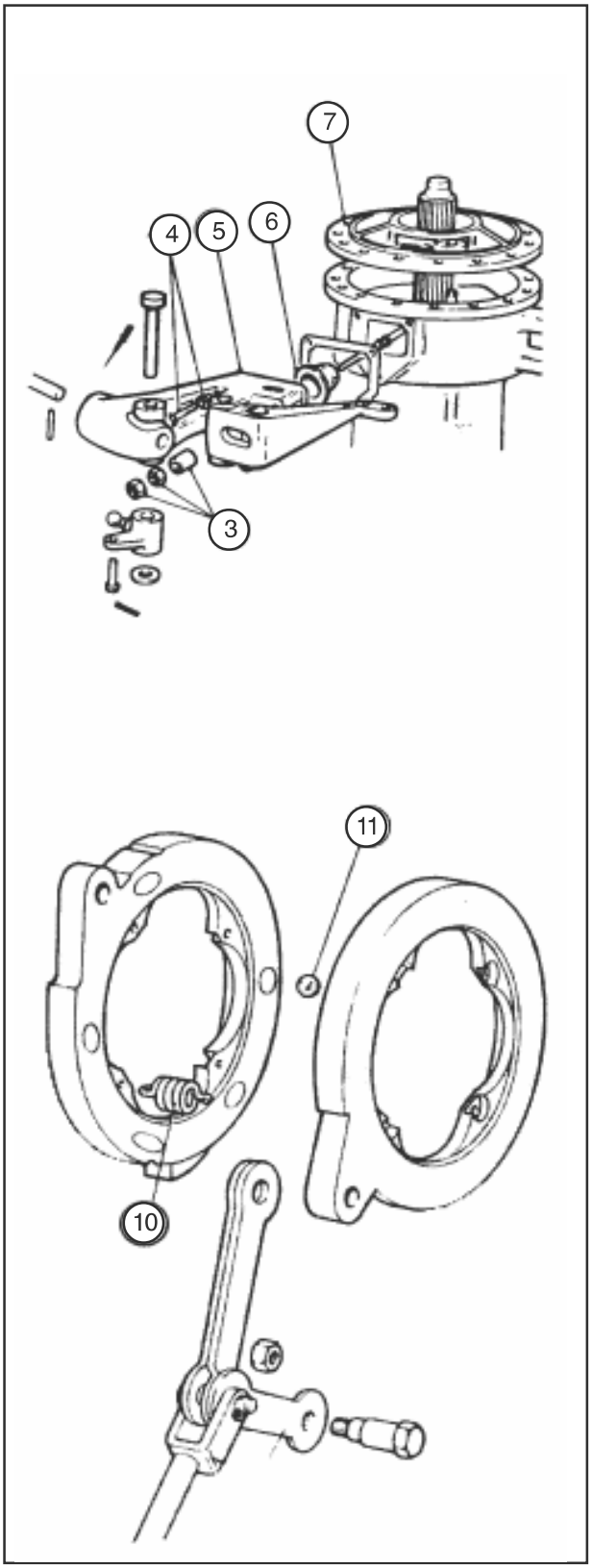


Fig 25

10B.17 DIFFERENTIAL LOCK ACTUATOR MECHANISM

Removal and Refitment

Removal

1. Remove the right-hand axle housing. (see operation 10B.8)
2. Manoeuvre the axle housing assembly off the jack and stand it on end.
3. Lift up the rubber seal
4. Release the locknut.
5. Rotate the differential lock operating lever out of engagement with the actuator fork.
6. Unscrew the fork from the shaft complete with its locknut and rubber seal.
7. Remove the carrier plate. (see operation 10B.11)
8. Remove the shaft, complete with the spring, washer, circlip and 'O' ring.

Examination

Examine the shaft for signs of wear or scoring. Clean and degrease the threads in the end of the shaft, and on the actuator fork.

Refitment

9. Fit a new 'O' ring to the shaft. If renewing the shaft, a new washer and circlip should be fitted.
10. Refit the shaft taking care not to damage the 'O' ring.
11. Refit the spring.
12. Refit the carrier plate. (see operation 10B.11)
13. Smear the threads of the actuator fork with loctite 241, then screw the fork fully into the shaft.
14. Unscrew the actuator fork until it will engage the differential lock operating lever in the horizontal position.
15. Tighten the locknut.
16. Push the rubber seal into position.

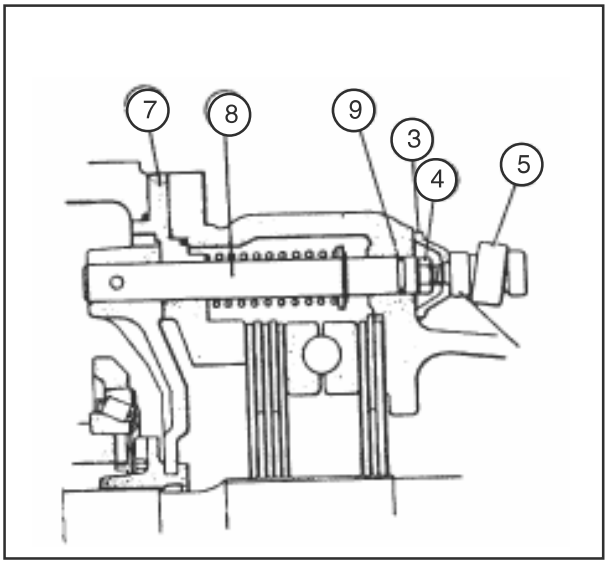


Fig 26

DIFFERENTIAL LOCK

Adjustment

1. Ensure that the pedal operates freely throughout its complete travel.
2. With the differential lock disengaged, the measurement between the inner flange of the actuator rod and the side of the diff casting should be 1.25 inch (31mm). This should give a measurement of 0.25-0.5 inch (6.35-12.7 mm) between the bottom of the foot pedal and the footstep.
3. If this is incorrect lift back the rubber seal covering the actuator fork locknut. Slacken the locknut then rotate the fork to obtain the measurement given.
4. Apply loctite 241 to the threads of the fork and then tighten the locknut.
5. Refit the rubber seal.

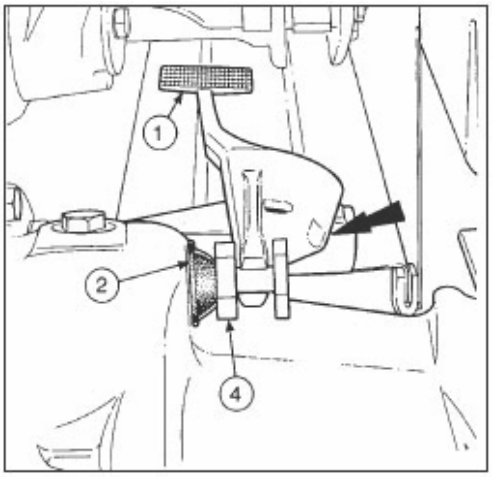


Fig 27

10B.18 DIFFERENTIAL LOCK COUPLER CAP

Removal and Replacement

Special tools : SER/029 Universal Pulley
SER/028 Puller Adaptor
SER/163 Bearing Driver

Removal

1. Remove the right-hand axle housing. (see operation 10B.8)
2. Remove the bearing cone using puller SER/028 and SER/029.

Note : *For clarity, the illustration shows the Differential removed. However for the actual operation this is not necessary.*

3. Remove the eight bolts.
4. Raise off the cap taking care not to Dislodge the case which would allow the differential gears to fall out.

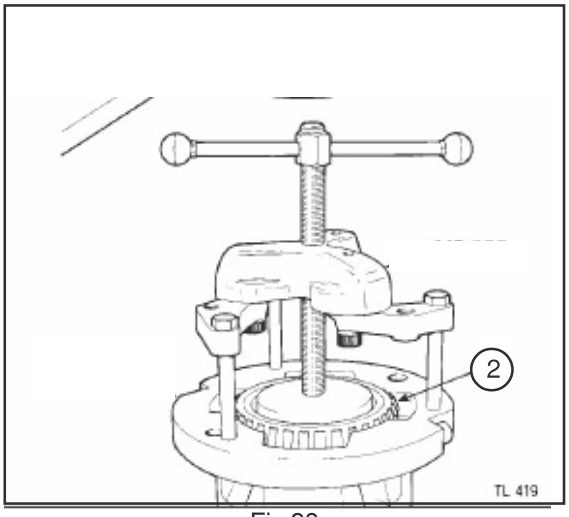


Fig 28

Replacement

5. Fit the new coupler cap.
6. Insert and hand tighten the eight bolts.
7. Tighten the bolts progressively, and evenly to a torque of 80 lbf ft (108 Nm)
8. Refit the bearing cone using SER/163.
9. Refit the axle housing.

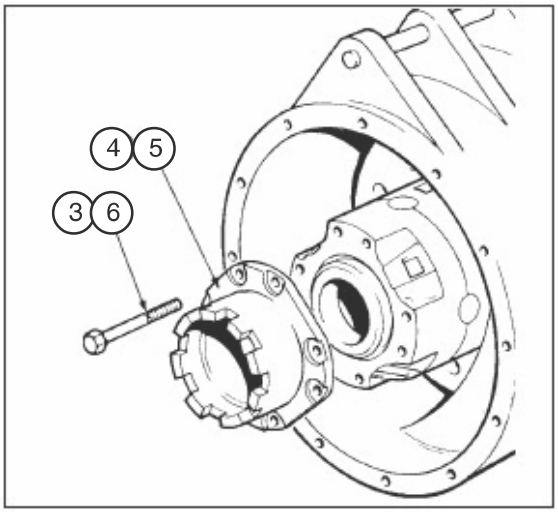


Fig 29

10B.19 DIFFERENTIAL LOCK

Pre-load Checking and Adjustment

Tool : **Differential Bearing (Diff lock mechanism) Preload Gauge**

Tool No. : **SER/023**

Purpose : Preload check for differential side bearing. (Diff lock mechanism)

Application : Oil immersed brakes

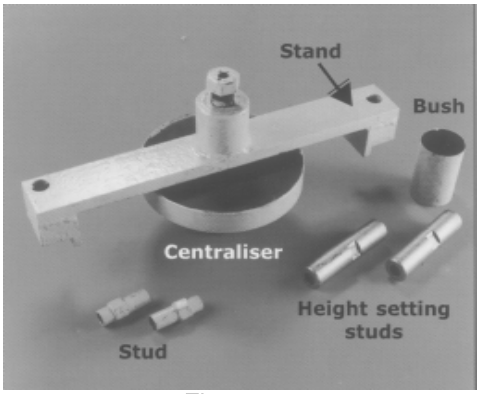


Fig 30

Tool : **Straight Edge used in conjunction with SER/023.**

Tool No. : **SER/024**

Purpose : To determine the shim size for preloading.

Application : Oil immersed brakes

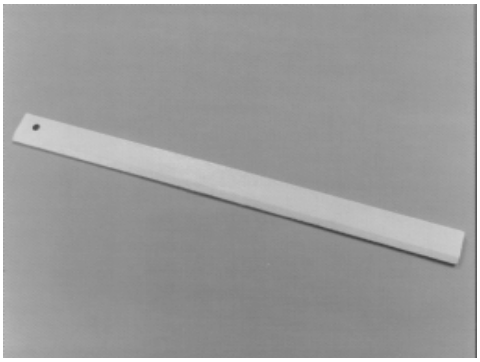


Fig 31

Procedure :

1. Remove the right-hand axle housing.
2. Insert the bush of the tool inside the Differential Case.

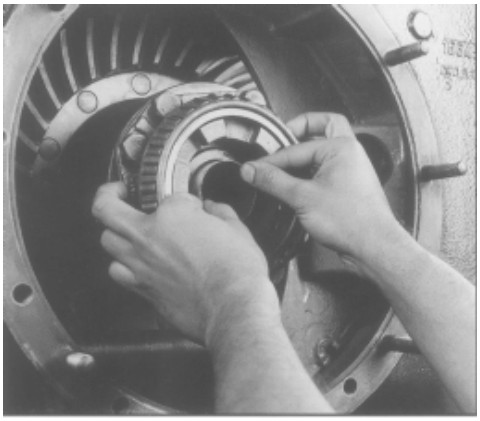


Fig 32

3. Insert the Centralizer of the tool with Bearing cup.

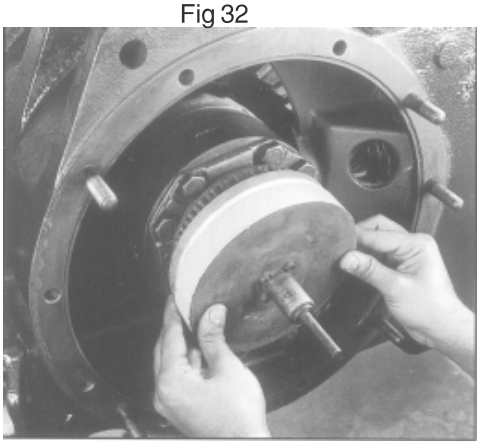


Fig 33

4. Position the tool stand with the help of 2 studs and tighten the centre nut to a torque of 18 lbf.ft (25 Nm).

Precautions :

1. Ensure proper seating of tool stand on Centre Housing.
2. Do not over tighten the centre nut of the tool.

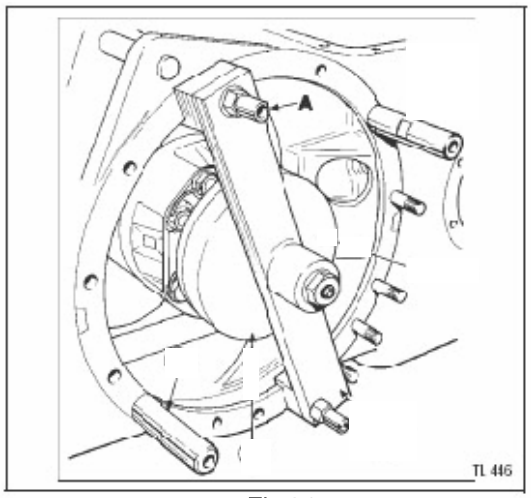


Fig 34

4. Fix the height setting studs diagonally opposite to tool stand, place the Straight Edge on it and measure the gap between the centre nut and Straight Edge using a Feeler Gauge. This gap determines the shim size. (see below)

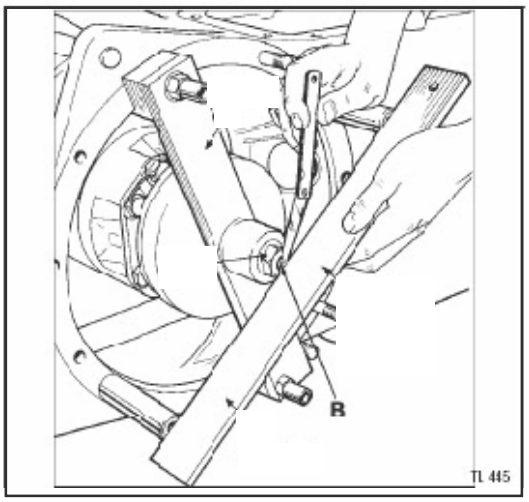


Fig 35

Table for shim selection		
Feeler Gap (Equal Shield thickness)		Means of Identification
mm	inch	
0.45 - 0.53	0.019 - 0.021	Eight Dots
0.61 - 0.66	0.024 - 0.026	Seven Dots
0.74 - 0.79	0.029 - 0.031	No Dots
0.86 - 0.91	0.034 - 0.036	One Dot
0.99 - 1.04	0.039 - 0.041	Two Dots
1.12 - 1.17	0.044 - 0.046	Three Dots
1.25 - 1.30	0.049 - 0.051	Four Dots
1.37 - 1.42	0.054 - 0.056	Five Dots

After selecting the shim, remove the tool assembly from Centre Housing and the Bearing cup. Fit the selected shim behind the Bearing cup on Axle Housing right-hand. Assemble the Axle Housing right-hand in the usual manner.

10B.20 RIGHT HAND DIFFERENTIAL BEARING

Removal and Refitment

Special Tools : SER/028 Puller Main rod
SER/162 Bearing Driver
SER/163 Bearing Drive
SER/029 Adapter

Removal

1. Remove the right-hand axle housing. (see operation 10B.8)
2. Pull off the bearing cone using puller SER/028 and SER/029
3. Remove the carrier plate and drive out the bearing cup.

Replacement

4. Drive the new bearing cone to the differential lock coupler cap using SER/163 and SER/162.
5. Check the bearing pre-load.

10B.21 DIFFERENTIAL UNIT

Removal and Refitment

1. Remove the left-hand axle housing. (see operation 10B.7)
2. Manoeuvre the differential assembly out of the centre housing.

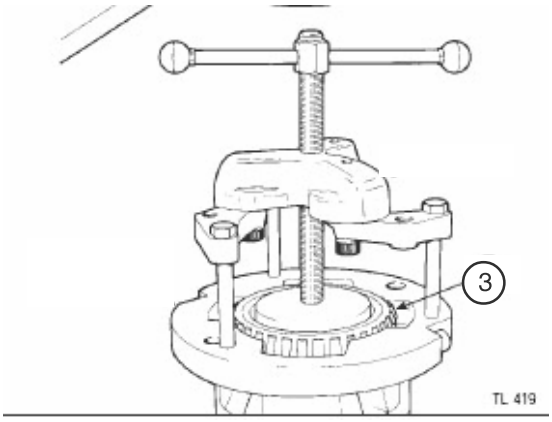
Warning: The differential unit is heavy and awkward to handle. Take care when removing and refitting it.

Refitment

3. Manoeuvre the differential unit into the centre housing, engaging the splines of the right-hand axle shaft.

Note: *If any of the differential component have been replaced, the Pre-load should be checked.*

4. Refit the left-hand axle housing. (see operation 10B.7)



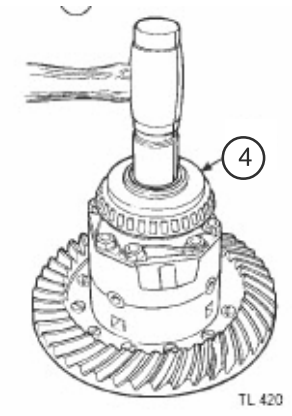


Fig 36

10B.22 DIFFERENTIAL LEFT HAND BEARING

Removal and Replacement

Special Tools :

SER/G/204	To press cup on diff. carrier (Left-hand)
SER/G/207	To press cone on differential lock.
SER/G/228	Plate diff. carrier cone removal
SER/G/227	Diff. case (Left-hand) cup removal

Removal

1. Remove the differential .
2. Remove the left-hand carrier plate.
3. Assemble SER/G/228, then pull Off the bearing cone.
4. Assemble SER/G/227 and pull out the bearing cup.

Replacement

5. Assemble SER/G/204 with a new bearing cup.
6. Pull the new cup into the differential unit.
7. Fit the new bearing cone ,

   Then drive it fully onto the carrier plate using

   A hammer and SER/G/207.
8. Refit and differential unit.
9. Check the differential pre-load.

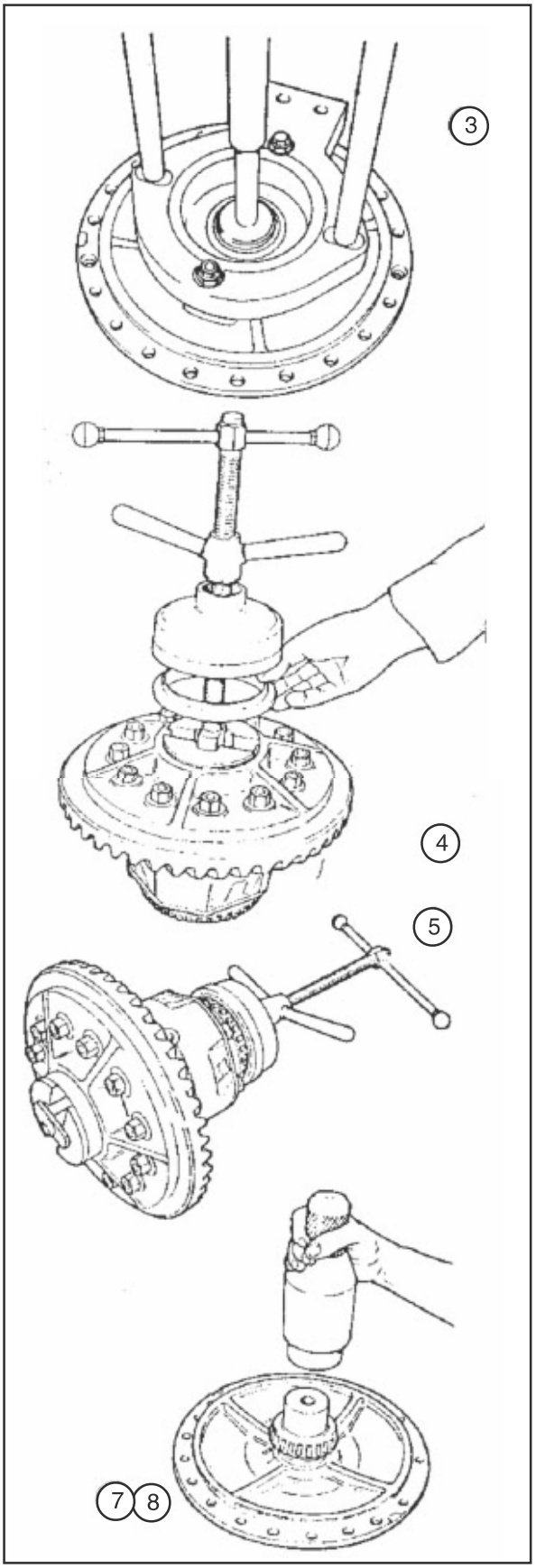


Fig 37

10B.23 DIFFERENTIAL UNIT

Servicing

Special Tools :

SER/017	Holder
SER/018	Bench Adaptor
SER/028	Universal Puller
SER/029	Adaptor
SER/G/207	To press cone on diff. lock

Disassembly

1. Remove the differential unit. (see operation 10B.21)
2. Fit SER/018 to the bench.
3. Fit SER/017 to SER/018.
4. Place the differential on SER/018.
5. Remove the bearing cone using puller SER/028 and SER/029.
6. Remove the eight bolts.
7. Remove the coupler cap and right-hand case.
8. Remove the cross joint and pinions assembly with the thrust washers.
9. Remove the differential gears and their thrust washers.

Examination

Examine all of the differential components and replace any that are worn or damaged.

Note: *If any of the spider gears are worn, a full set of four new gears should be fitted. In such circumstances, differential gears may also need to be replaced.*

Reassembly

Reverse procedures 2 to 9 except:

a. Refit the right-hand differential case with the marking aligned.

b. Tighten the eight bolts to a torque of 108 Nm (80 lbf ft).

c. Refit the bearing cone using SER/G/207.

10. Refit the differential unit.

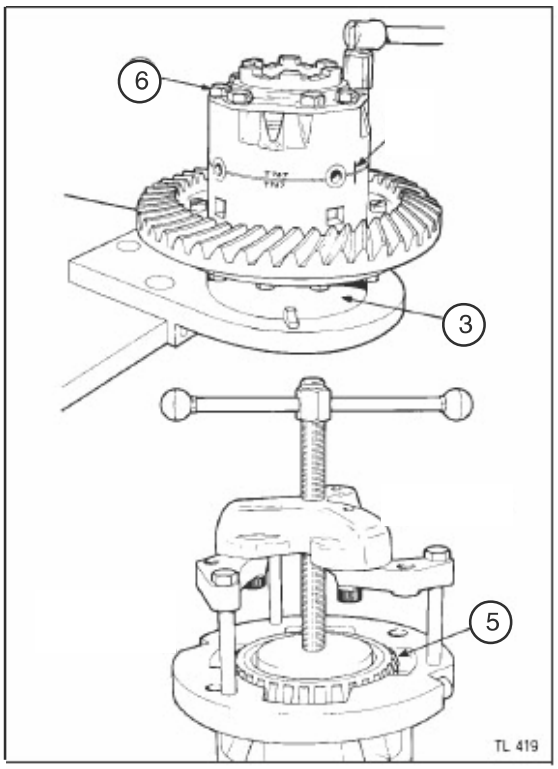


Fig 38

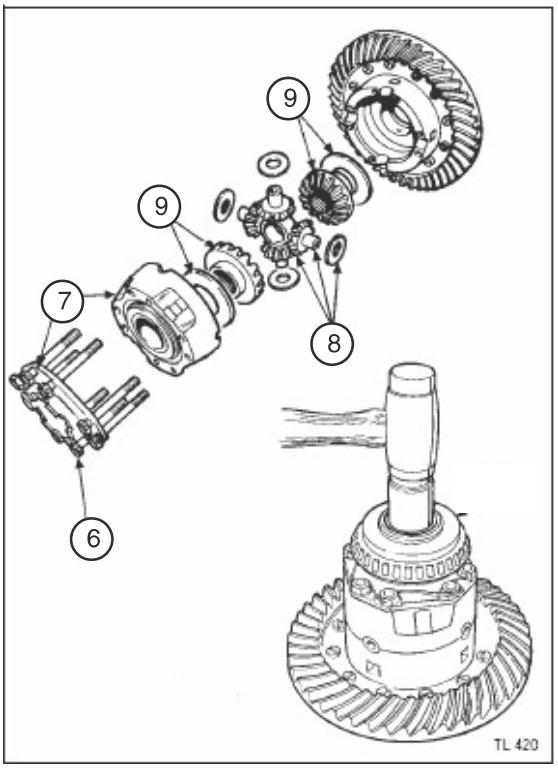


Fig 39

10B.24 CROWN WHEEL

Removal and Replacement

Special tools :

SER/017	Holder
SER/018	Adaptor

Removal

1. Remove the differential gears. (see operation 10B.23)
2. Place the differential unit on a bench with the teeth facing downwards.
3. Centre punch each of the rivet heads, centrally.
4. Using a 13 mm (1/2 in) drill, drill out each of the rivet heads until they become detached from their shanks.
5. Drive out the rivets.
6. Drive off the crown wheel.

   Note: *When fitting a new Crown wheel, the pinion must also be replaced.*

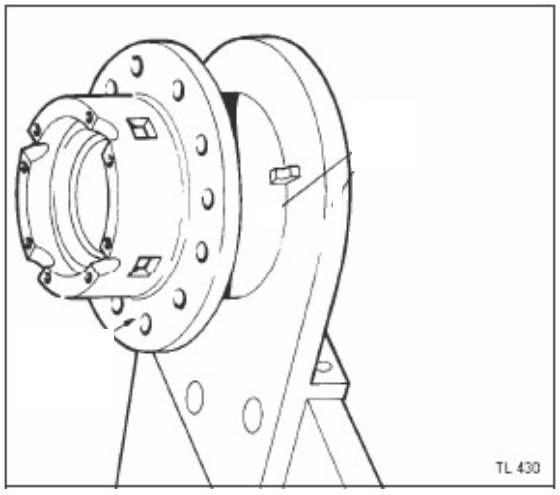


Fig 40

Replacement

7. Ensure that the mating faces of the differential case and the new crownwheel are perfectly flat.
8. Fit SER/017 and SER/018 to the bench.
9. Fit the left-hand differential case, with the mating face upwards.
10. Degrease the crownwheel, left-hand differential case, differential bolts and nuts with brake cleaner.
11. Collect together all items necessary for speedy assembly.

These items are :

A torque wrench, the correct size socket and apply Loctite to the threads.

12. Open the epoxy resin kit 1852913M91. Its contents are:
    One jar containing 10 ml of resin. (This jar is also used as a mixing vessel).
    One jar containing 5 ml of hardener.
    One glass stirring rod.
    One bush.
13. Pour the hardener into the resin jar and mix thoroughly using the glass rod.
14. Apply an even coating of adhesive to both mating surfaces.

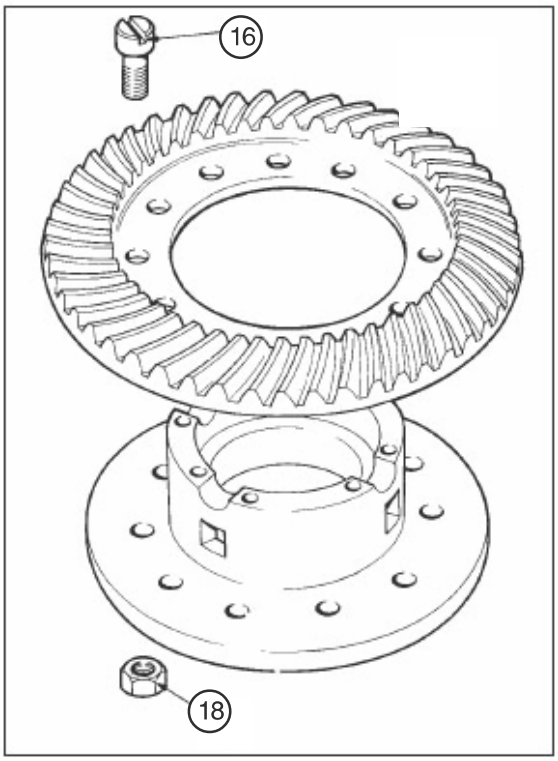


Fig 41

15. Fit the crownwheel to the differential case.

    Note: *These two components are in interference fit and must, therefore, have their bolt holes aligned accurately before being fitted together.*

16. Fit the twelve bolts with their heads nearest the crownwheel teeth.
17. Apply two drops of Loctite to the first thread of each bolt.
18. Fit the nuts, and tighten them progressively and evenly to a torque of 118 lbf. ft (160 Nm).
19. Refit the differential components. (see operation 10B.21).

    Note: *Operations 14 to 18 must be completed within 30 minutes of mixing the resin and harder.*

20. Cure the resin bonding by subjecting the differential assembly to uniform heating as follows:-
    a. 120 degree centrigrades (248^{O}F) for a minimum of 1 hour
    b. or 40 degree centrigrade (105 F) for a minimum of 12 hours
    c. or 30 degree centrigrade (86^{O}F) for a minimum of 16 hours
    d. or 20 degree centrigrade (68^{O}F) for a minimum of 24 hour
21. Refit the differential unit. (see operation 10B.20)

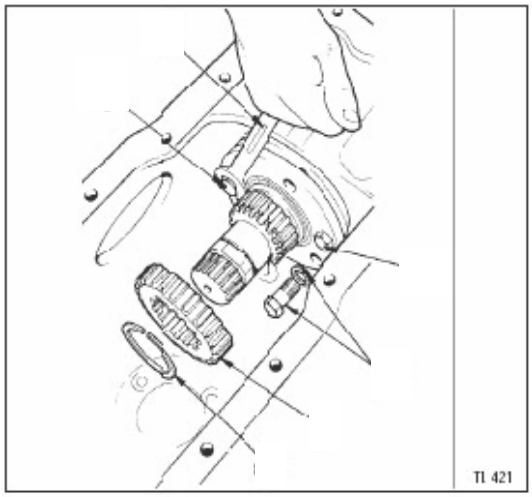


Fig 42

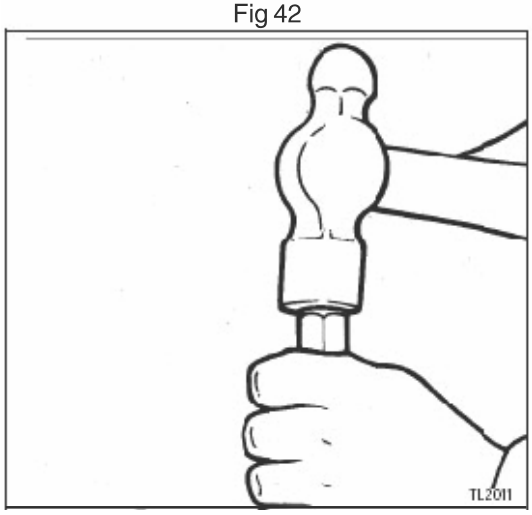


Fig 43

10B.25 PINION ASSEMBLY

Servicing

Special Tools :

SER/038 Hand Press
SER/059 Adaptor
SER/056 Adaptor
SER/061 Pre-load Gauge
SER/060 Pinion lock nut 'C' Spanner.
SER/064 Preload checking aid

Disassembly

1. Remove the pinion assembly.
2. Remove the locking ring as follows.

a. Place the pinion in a soft faced vice with the jaws of the vice holding the flats, adjacent to the collar locking rollers.

b. Release the tab washer from the lock nut.

c. Remove the lock nut by using SER / 060 and SER / 064.

d. Remove the tab washer and locknut

Note: *Great care should be taken to avoid damaging the threads of the pinion.*

3. Remove the oil slinger.
4. Remove the housing, complete with the front bearing cone.
5. Fit the pinion to SER/038 with SER/059 and SER/056. Press off the bearing.
6. Remove the snap ring securing the pilot bearing to the pinion.
7. Fit the pinion to SER/038 using adaptor SER/059 then press off the pilot bearing.

Examination

Examine all components for signs of wear, scoring or pitting. Any faulty or worn parts must be replaced.

Note:

a. If the pinion is damaged the crown wheel must also be replaced as these are only supplied in matched sets.

b. The taper roller bearings are serviced as a pair, assembled with the housing.

c. New snap rings should always be fitted.

Reassembly

8. Using SER/038 and SER/059, press the pilot bearing on the pinion.
9. Secure the pilot bearing with a new snap ring.
10. Using SER/038 and SER/059 and SER/056 press the bearing onto the pinion.
11. Locate the pinion in its housing and fit the front bearing cone.
12. Refit the oil slinger and a new locking ring, hand tightened.
13. Hold the housing in a soft faced vice.
14. Fit a SER/061 pre-load gauge to the pinion and tighten the locking ring to give a pre-load reading of 18 - 22 lbs.inch (2 - 2.5 Nm).
15. Remove the gauge, tap the pinion firmly to centralize the bearings, then re-check the pre-load.

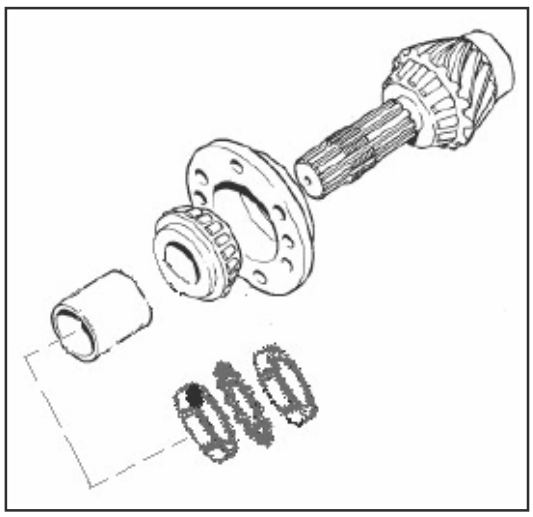


Fig 44

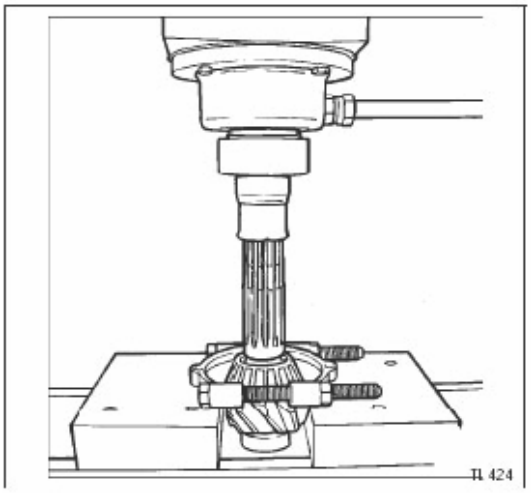


Fig 45

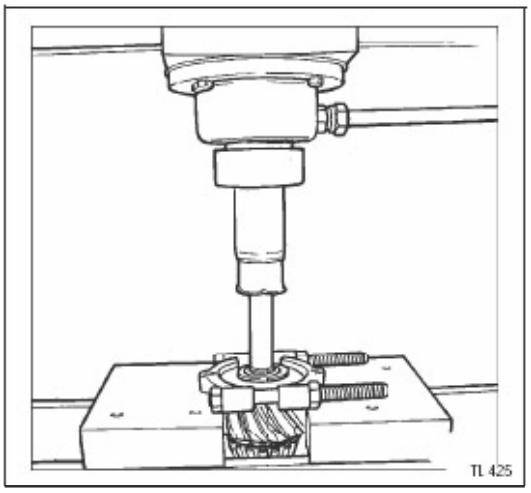


Fig 46

16. Secure the locking ring by tapping a locking roller down either side of one of the pinion splines.

Note: The needle rollers must be driven flush with the locking collar.

Before refitment, the pinion assembly should be freely lubricated with clean transmission oil.

17. Refit the pinion assembly.

Fig 47

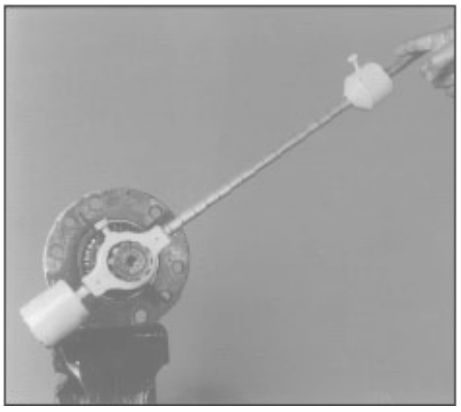


Fig 48

10B.26 REAR DRIVE SHAFT

Servicing

Special tools: SER/022 Needle Roller Bearing Puller
SER/063 Needle Roller Bearing Driver
SER/058 Universal Handle

Disassembly

1. Remove the lift cover.
2. Remove the split pin from the shear tube.
3. Remove the shear tube.
4. Remove the rear drive shaft.
5. Locate the end of SER/022 underneath the bearing cage.
6. Extract the bearing.
7. Remove the plunger and spring.

Examine the drive shaft for signs of wear and fit a new needle roller bearing.

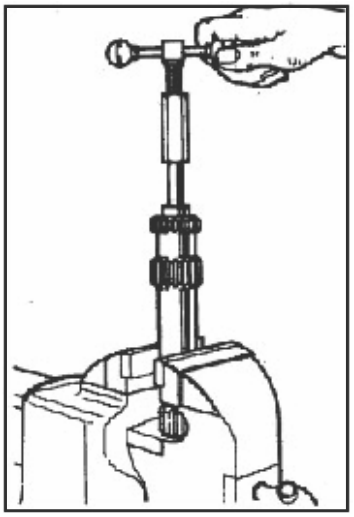


Fig 49

Reassembly

Reverse procedures 1 to 7 except:

a. Place the bearing depth control collar (SER/063) on the end of the driveshaft over the new bearing. Drive the bearing into the drive shaft using SER/063 and the SER/058 universal handle until the tool contacts the depth control collar.

b. Fit a new split pin to give an end float of 0.015 to 0.100 inch (0.40 to 2.50 mm).

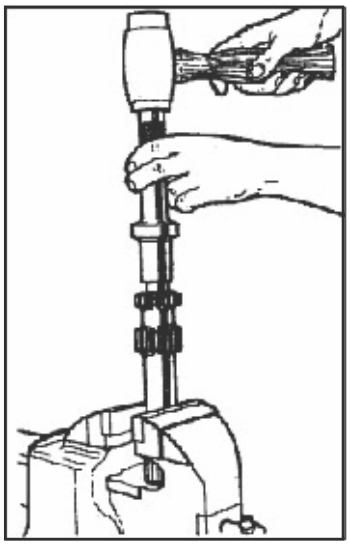


Fig 50

10B.27 PARKING BRAKE SERVICING

Removal and refitment:

Removal:

1. Disconnect the two parking brake cables from the brake actuators and at the anchor points on the side cover.
2. Remove the two bolts securing the parking brake assembly to the frame of the tractor.
3. Withdraw the parking brake assembly and the two cables.
4. Remove the cables if necessary.

Refitment:

5. Reverse the procedure 1 to 4 except.

   a. Route the right hand cable over the transmission case ensure that it has no sharp bends.

   b. Check the brake operates freely.

6. Adjust and balance the brakes (see the operation 10B.14).

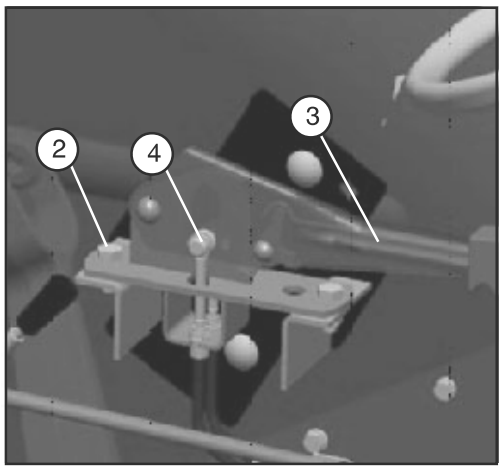


Fig 51